PATENT SPECIFICATION

817,860

Date of Application and filing Complete Specification Oct. 13, 1955.
No. 21393/57.
Application made in United States of America on Oct. 18, 1954.
(Divided out of No. 817,851).
Complete Specification Published Aug. 6, 1959.

Index at acceptance:—Class 69(3), I7.
International Classification:—B05.

COMPLETE SPECIFICATION

Improvements in or relating to Washing Apparatus

We, AJEM LABORATORIES INC., a Corporation of the State of Michigan, whose post office address is 38899, Schoolcraft Road, Livonia, Michigan, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to washing apparatus adapted for industrial applications for cleaning various manufactured articles. This invention is described as embodied in a machine for high-pressure washing, rinsing and drying of metal parts, for example such as crankshafts and camshafts of internal combustion engines.

The present invention consists in a washing machine in which there is provided an adjustable spray nozzle comprising a pipe with a large aperture therein and in which a C-shaped clamp is located on said pipe, one arm of the clamp being transversely wider than and covering said aperture and also having a smaller aperture therein communicating with the larger aperture in the pipe, the other arm of the clamp having a tightening screw whose end contacts the side of the pipe opposite the large aperture, a spray director being supported on the clamp approximately in alignment with the smaller aperture, and the clamp being rotatable about the axis of the pipe whereby the direction of the spray may be adjusted.

Preferably the spray director is bullet-shaped and is supported by arms depending from the first-mentioned arm of the C-shaped clamp.

In order that the invention may be more clearly understood reference will now be made to the accompanying drawings which show one example of a machine embodying the present invention and one specific embodiment of the adjustable spray nozzle assembly of the invention and in which:—

Fig. 1 is a partially diagrammatic side elevation showing a machine embodying the spray nozzle assembly of the present invention;

Fig 2 is a cross-sectional view taken along the line 2—2 in Fig. 1 looking to the right and showing, on enlarged scale, the arrangement of the high-pressure spray nozzles in one of the washing stations of the machine in Fig. 1 with a crankshaft in indexed position in this washing station;

Fig. 3 is an enlarged side view of one of the adjustable high pressure spray nozzles used in the washing and rinsing stations of the machine in Fig. 1.

In the machine shown in Fig. 1, the crankshafts 12 to be cleaned are transferred in sequence from a production line at the left of the machine (not shown) on to pairs of holding jigs 14 which are arranged near opposite sides of a continuous conveyor 16 so as to support the crankshaft horizontally and extending across the conveyor from side to side, as seen in Fig. 2. This conveyor 16 comprises a pair of spaced parallel chains 18 with a plurality of removable frames 20 extending between the chains at every fourth link, each frame including a cross bar 22 with one of the holding jigs 14 on the top side near each end as described in detail below.

The conveyor 16 passes up around a pair of large idler sprockets 24 at the left of the machine which engage the chains 18 and guide the conveyor into the machine where it is pulled to the right by means of a pair of drive sprockets 26. The conveyor 16 passes in succession through a washing stage 28, a rinsing stage 30, and a drying stage 32 and then exits from the machine near the drive sprockets 26, the cleaned crankshafts then being removed from the jigs 14 and passed in sequence to the next production step. The empty conveyor 16 returns under the machine past a number of smaller idler sprockets 33 with the chains 18 running along supporting guide tracks 34 formed by angle irons extending longitudinally of the machine underneath it.

In each stage are a number of separate stations 35 wherein particular areas of the

crankshafts are subjected to high speed streams of fluid. The conveyor 16 is advanced intermittently through the machine with each pair of jigs 14 pausing briefly in each station in succession. A partition 36 with a small door 37 for the conveyor and crankshaft separates the stages 28 and 30, and a similar partition 38 with a door 39 separates the stages 30 and 32.

At the bottom and extending off to one side (see also Figure 2) of the washing stage 28 is a tank 38 holding washing liquid, indicated at 40. This solution is sucked into the bottom of a two-stage centrifugal pump 41 and forced out of the upper stage 42 at extremely high pressure through pipes 43 and a pair of manifolds 44 extending along parallel to the chains 18. Connected to the manifolds 44 are a plurality of transverse pipes 46, some extending across the machine above the conveyor 16 and others below the conveyor. Each of these transverse pipes 46 includes several openings over each of which are clamped adjustable spray nozzles 48 and jet nozzles 50 described in detail hereinafter. These nozzles 48 and 50 are arranged to direct a high speed spray or stream, respectively, of washing solution at various predetermined areas of each crankshaft, as they pause in each station. The pump 41 is supported by a bracket 52 from the top 53 of the side extension of the tank. The pump has a vertical shaft 54 extending up in a housing through a bearing 58 to sheaves 60 driven by V-belts from a suitable electric motor 62. A suitable high pressure two-stage centrifugal pump for use in the machine 10 is described in detail in our copending Application No. 29205/1955 (Serial No. 804,997).

As indicated in Figs. 1 and 2, the adjustable nozzles 48 are aimed at various specific areas of the crankshaft. A pair of these nozzles 64 and 66 are aimed at opposite ends of the crankshaft to squirt streams of washing solution into the passages in the interior of the crankshaft, to thoroughly clean it. Thus, advantageously, every facet of the crankshaft receives in turn a thorough high pressure washing with the washing solution in each case impinging on the various crankshaft surfaces at the optimum cleaning angles, enabling the cleansing to be done in a brief time.

The partition 36 keeps the washing solution from entering the rinse stage, and, if desired, a flexible curtain may be hung in the door 37 to provide further isolation. As shown in Fig. 1, the rinse stage may be substantially identical with the washing stage and parts in the rinse stage performing corresponding functions are indicated with corresponding reference numerals followed by the suffix "a".

After leaving the rinse stage 30 the jigs 14 pass through the drying stage 32 wherein the crankshafts 12 are dried by air drawn in through a steam-heated radiator 64 and driven by a pump 66 into a manifold 68 connected to various hot air nozzles 69. A pair of these hot air nozzles 70 are directed at the opposite ends of the crankshaft in the last station 35 to dry out their internal passages. The connection to the steam pipes in the radiator 64 is made by pipes 72.

In Fig. 3 is shown, on considerably enlarged scale, a cross-sectional view of one of the adjustable spray nozzles 48 clamped in position on a pipe 46, shown in cross section. A large hole 150 is drilled in the pipe 46 and arranged to face in the general direction toward which the spray or stream of high speed fluid is intended to go.

The adjustable nozzle includes a generally C-shaped clamp having one end 152 with a surface broad enough to cover the hole 150. A smaller orifice 154 extends through the end 152 of the clamp and is over the larger hole 150 in the pipe 46. The opposite end 155 of the C-shaped clamp has an adjustable clamping bolt 156. The stream of fluid issuing from the small orifice 154 passes a bullet-shaped director 158 supported by arms 160 from the end 152 and advantageously is broken into a high-speed spray.

The adjustable nozzles 50 are generally similar to the adjustable nozzles 48 except that connected with the orifice 154 in place of the director 158 is a pipe (as shown in Fig. 2) secured to the arm 152. The inside diameter of this pipe, is smaller than the diameter of the hole 150 in the pipe 46, and therefore enables the arm 152 to be moved around pipe 46 over a considerable angular range without shutting off the fluid supply through aperture 150 and the said pipe.

The present invention is divided from copending Application No. 29206/55 (Serial No. 817,851).

WHAT WE CLAIM IS:—

1. A washing machine in which there is provided an adjustable spray nozzle comprising a pipe with a large aperture therein and in which a C-shaped clamp is located on said pipe, one arm of the clamp being transversely wider than and covering said aperture and also having a smaller aperture therein communicating with the larger aperture in the pipe, the other arm of the clamp having a tightening screw whose end contacts the side of the pipe opposite the larger aperture, a spray director being supported on the clamp approximately in alignment with the smaller aperture, and the clamp being rotatable about the axis of the pipe whereby the direction of the spray may be adjusted.

2. A washing machine as claimed in Claim 1, in which the spray director is bullet-shaped and is supported by arms depending from the first-mentioned arm of the C-shaped clamp.

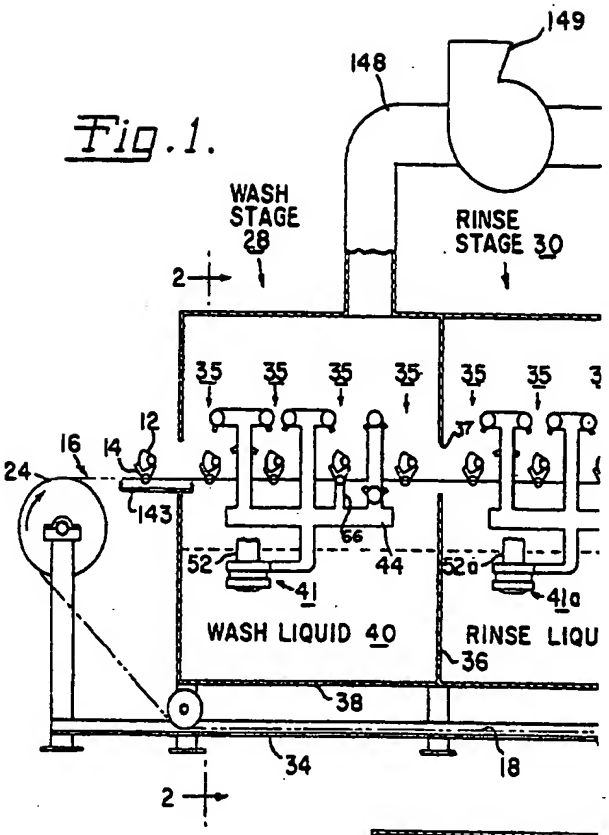
3. A washing machine as claimed in Claim 1, in which the spray director is a pipe having one end secured to the first-mentioned arm

of the C-shaped clamp around said small aperture.

BARON & WARREN,
16, Kensington Square, London, W.8,
Chartered Patent Agents.

Leamington Spa: Printed for Her Majesty's Stationery Office, by the Courier Press.—1959.
Published at The Patent Office, 25, Southampton Buildings, London, W.C.2, from which copies may obtained

Fig. 1.



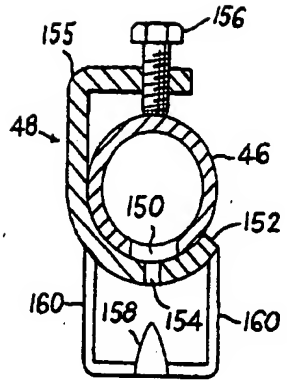
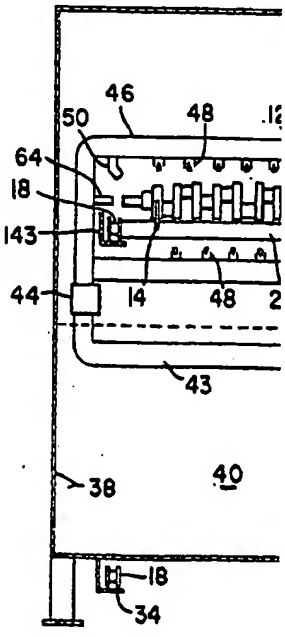


Fig. 3.

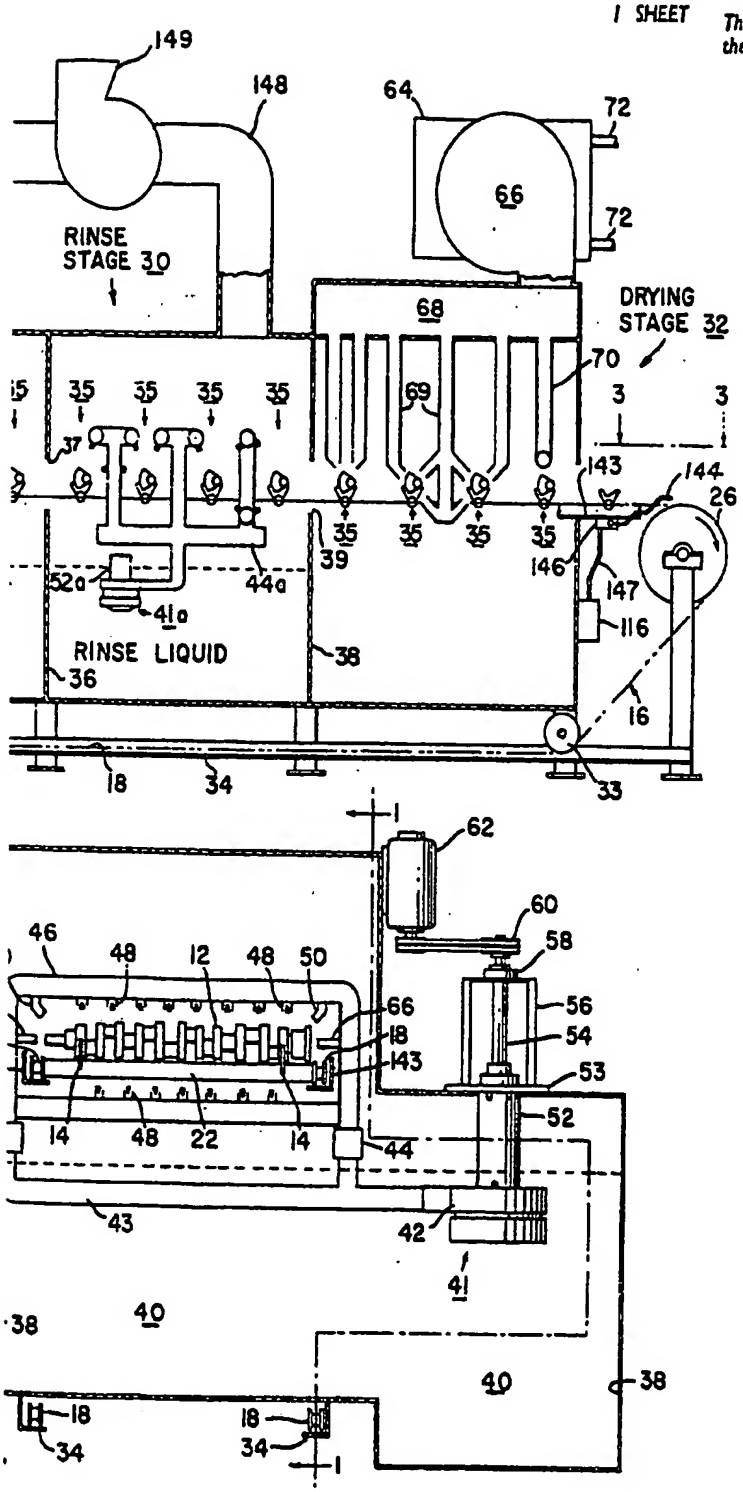
Fig. 2.



817,860 COMPLETE SPECIFICATION

1 SHEET

This drawing is a reproduction of the Original on a reduced scale.



817,860 COMPLETE SPECIFICATION
1 SHEET
This drawing is a reproduction of the Original on a reduced scale.

Fig. 1.

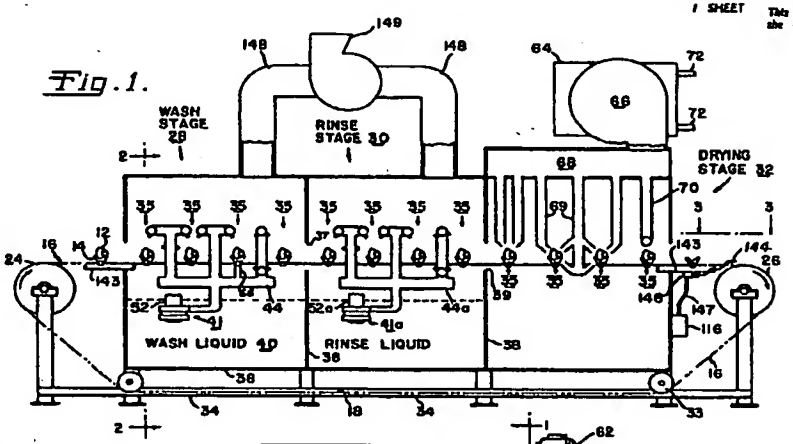


Fig. 2.

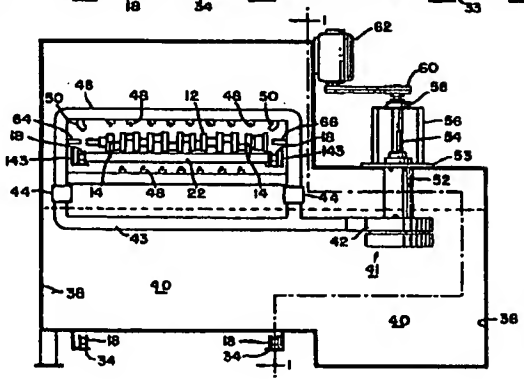


Fig. 3.